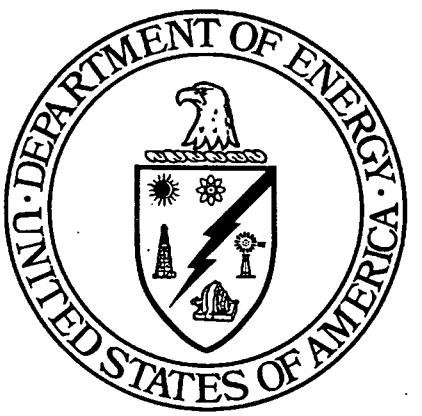
1955

# CERTIFICATION DESIGN LETTER FOR AREA 8, PHASE II AND AREA 6 TRIANGLE AREA

## FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
## FERNALD, OHIO






JANUARY 1999

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

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1

# TABLE OF CONTENTS

1955



## LIST OF TABLES



## LIST OF FIGURES





2

## LIST OF ACRONYMS AND ABBREVIATIONS

1955

| | |
|---|---|
| A6TA | Area 6 Triangle Area |
| A8PI | Area 8, Phase I |
| A8PII | Area 8, Phase II |
| ASCOC | area-specific constituent of concern |
| ASL | analytical support level |
| BTV | benchmark toxicity value |
| CDL | Certification Design Letter |
| COC | constituent of concern |
| CU | certification unit |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CRDL | Contract Required Detection Limit |
| DOE | U.S. Department of Energy |
| EPA | U.S. Environmental Protection Agency |
| FEMP | Fernald Environmental Management Project |
| FRL | final remediation level |
| HPGe | high purity germanium detector |
| mg/Kg | milligram per kilogram |
| NaI | sodium iodide |
| OEPA | Ohio Environmental Protection Agency |
| OU5 | Operable Unit 5 |
| pCi/g | picoCuries per gram |
| ppm | parts per million |
| PSP | Project Specific Plan |
| RSS | Radiation Scanning System |
| RTRAK | Radiation Tracking System |
| ROD | Record of Decision |
| SED | Sitewide Environmental Database |
| SEP | Sitewide Excavation Plan |
| UCL | Upper Confidence Limit |
| V/FCN | Variance/Field Change Notice |

# EXECUTIVE SUMMARY

1955

This Certification Design Letter (CDL) describes the certification approach for Area 8, Phase II (A8PII) and the Area 6 "Triangle Area". The following information is included:

- A definition of the boundaries of the areas to be certified under the guidance of this CDL
- Presentation of historical data and newly acquired precertification real-time data
- A discussion of the area-specific constituent of concern (ASCOC) selection process and list of ASCOCs assigned to A8PII and the Area 6 Triangle Area (A6TA).
- A presentation of the certification unit (CU) boundaries and proposed sampling strategy
- The analytical requirements and the statistical methodology that will be employed
- The proposed schedule for the certification activities.

The scope of this CDL is limited to A8PII and the southern portion of the A6TA. A8PII is an 18.56-acre plot of land on the northwest corner of the site, and the A6TA is the portion of the Fernald Environmental Management Project (FEMP) property located west of Paddys Run Road. The northern portion of this land (the railroad track corridor) will be certified after completion of Waste Pit remediation since rail shipments of contaminated material will be shipped across the rail line as part of remediation. These perimeter areas of the site are located upwind of the former production area. While few historical soil samples were collected in these areas, and a review of these data shows that no soil contamination was found to exceed any of the final remediation levels (FRLs), and no remedial action is required. This conclusion is supported by the precertification data collected using real-time gamma sensitive field instruments.

The certification design presented in this CDL follows the general approach outlined in Section 3.4 of the Sitewide Excavation Plan (SEP) (DOE 1998a). The selection of Area 8 ASCOCs was accomplished using constituent of concern (COC) lists in the Operable Unit 5 (OU5) Record of Decision (ROD) (DOE 1996), process knowledge of the site COCs and release history. While the SEP identifies the Triangle Area as part of Area 6, it is also a perimeter area, and will be treated as such during certification. Therefore, this process will begin with precertification, and total uranium, thorium-228, thorium-232, radium-226, and radium-228 (the sitewide primary COCs) will be considered ASCOCs in

every CU in these areas. Field work is scheduled to begin in May 1999, and the Certification Report will be issued August 31, 1999.

1955

# 1.0 INTRODUCTION

1955

This CDL describes the certification approach for demonstrating that soil in A8PII and the southern portion of the Area 6 Triangle Area (A6TA) meets the FRLs for all ASCOCs. The format of this CDL follows guidelines presented in the SEP. Accordingly, this CDL consists of six sections:

1.0 Introduction - Presentation of the purpose, objectives, and scope of this CDL

2.0 Historical and Precertification Data - Presentation and discussion of historical and precertification scanning data

3.0 Area-Specific Constituents of Concern (ASCOCs) - Discussion of selection criteria and ASCOCs for A8PII and the A6TA

4.0 Certification Units (CUs) - Presentation of design, sampling and analytical methodologies

5.0 Schedule

6.0 References

## 1.1 OBJECTIVES

The primary objectives of this document are to:

- Define the boundaries of the area to be certified under the guidance of this CDL
- Present historical data and newly acquired real-time data in the form of data maps of the area proposed for certification
- Define the ASCOC selection process and list the selected ASCOCs for those areas
- Present the CU boundaries and proposed sampling strategy
- Summarize the analytical requirements and the statistical methodology that will be employed
- Present the proposed schedule for the certification activities.

## 1.2 SCOPE

The scope of this CDL is limited to A8PII and the southern portion of the A6TA (Figure 1). A8PII includes the extreme northwest corner of the FEMP, including a portion of the FEMP property west of Paddys Run and north of the railroad tracks. This 18.56-acre parcel of land is primarily a grazed pastureland that is sparsely vegetated with large trees, especially along the Paddys Run corridor. It is

relatively flat, and slopes gently toward Paddys Run. The southeast corner of A8PII lies within the Paddys Run 100-year floodplain. A prominent drainage ditch drains stormwater from an off-property agricultural area. This ditch runs through a culvert beneath Paddys Run Road and across A8PII toward Paddys Run. A second drainage ditch in this area forms the southern boundary of A8PII at it the top of its north bank. This ditch drains some off-property soil along with the A6TA, which is the western-most portion of the FEMP site. The A6TA is 6.90 acres in size, and is primarily a flat, open field that contains the railroad line leading to and from the site. The topography and surface features of these areas are shown in Figure 2. Based on site knowledge, it is unlikely that these areas have been impacted above the FRLs by FEMP production activities since they are located upwind of the Former Production Area and because Paddys Run effectively isolates the surface water drainage that impacted other areas of the site. In addition, historical aerial photographs indicate no production related land uses for this land, with the exception of transporting site materials across the A6TA via the railroad line.

The perimeter location of A8PII makes it an ideal location for one of the initial FEMP natural resource restoration projects; therefore, it has been selected as the location for the Demonstration Forest Project. The conceptual design of the Demonstration Forest Project is currently underway, and project implementation is scheduled to begin in the spring of 2000, thus making A8PII a priority for certification in 1999. The SEP identifies the A6TA as part of Soil Remediation Area 6. While this is the case, the southern portion of this area will be tied into the A8PII certification effort so that its surface water drainage may be used in the A8PII Demonstration Forest Project. Because shipments of Waste Pit material will be crossing railroad line in the northern portion of the A6TA, this soil will not be certified until after the completion of Waste Pit remediation and the rail line is removed.

Based on existing soil contamination data and the perimeter location of A8PII and the A6TA, no soil excavation is anticipated to remove contaminated soil. Consequently, the remediation approach will follow Excavation Approach E, as discussed in Section 4.5 of the SEP. No Integrated Remedial Design Package will need to be submitted, and the certification process for these areas began with precertification scanning activities.

## 2.0 HISTORICAL AND PRECERTIFICATION DATA

Prior to conducting precertification and certification activities, all soil demonstrated to contain contamination above the associated FRLs or other applicable action levels must be evaluated for remedial actions, in accordance with the SEP. The OU5 ROD also commits the FEMP to remove any man-made objects, including debris, building foundations, and drainage systems, before a remediation area can be certified. However, there are no such objects within A8PII or the A6TA.

### 2.1 HISTORICAL DATA

Before initiating certification, all historical soil data pertinent to A8PII and the A6TA were pulled from the Sitewide Environmental Database (SED) (Table 1). As was the case with Area 8, Phase I (A8PI), very few soil contamination data were collected from these areas (see Figure 3). In A8PII, four borings were conducted and five soil samples were analyzed, three of which were surface samples. In the A6TA, three borings were conducted and three soil samples were analyzed, none of which were surface samples. Target analytes included only radiological constituents, and all results indicated that concentrations are below the FRLs and within background range. These historical data are too sparse to accurately characterize A8PII and the A6TA, but there is no reason to believe that contamination in A8PII and the A6TA is much different than in A8PI. The comprehensive certification sampling and analysis program conducted in A8PI clearly demonstrated that soil contamination in western perimeter areas of the site is as a whole, well below the FRLs. This information, along with the historical data from these areas supports the conclusion that no soil contamination is anticipated in A8PII or the A6TA.

Finally, existing data collected from within A8PII and the A6TA were also reviewed against the benchmark toxicity values (BTVs) of each constituent of ecological concern, and no BTV exceedences were identified. This finding is consistent with the Sitewide Ecological Risk Assessment, which determined that there was no risk to ecological receptors in the area west of Paddys Run.

### 2.2 PRECERTIFICATION DATA

According to guidelines established in Section 3.3.3 of the SEP, precertification activities were conducted in A8PII to evaluate residual radiological contamination patterns. During precertification Phase 1, a surface radiation survey was conducted over most of A8PII and the A6TA. This was done

using mobile sodium iodide (NaI) detectors that include a 4x4x16-inch NaI detector mounted on a tractor (a.k.a. the Real Time Radiation Tracking System [RTRAK]), or on a cart (a.k.a the Radiation Scanning System [RSS]). The RTRAK was used to collect information about surface soil contamination patterns over as much of A8PII and the A6TA as was accessible. The RTRAK could not access the wooded areas, so the RSS was used in its place. Because neither of these detectors are capable of accessing densely wooded area or steep banks, supplemental high-purity germanium (HPGe) detector readings were collected in these inaccessible areas using the no overlap (90.6 percent coverage option) to assure that any areas of elevated contamination were not missed. Due to snow cover and extremely wet soil conditions, precertification data could not be collected in some small areas. Details on the use and capabilities of the RTRAK, the RSS, and the HPGe are provided in the User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site (DOE 1998b) and Addendum H to the Sitewide Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Quality Assurance Project Plan (DOE 1998c).

The A8PII/A6TA precertification Phase 1 mobile NaI detector scan showed total activity results to be similar to those identified in A8PI, and several small areas of higher activity were identified, as shown on Figure 4. Of note, there is a berm along the north and west boundaries of A8PII that resulted from borrow material being collected from the center of A8PII during plant construction in the early 1950s. The mobile NaI readings at the base of this berm in the excavated portion of A8PII showed lower overall total activity readings than other portions of A8PII. Since this excavation took place prior to FEMP production, this is believed to be a function of varying soil type.

The precertification Phase 1 mobile NaI results for total uranium and radium-226 were primarily below the FRLs of 82 ppm and 1.7 pCi/g, respectively, and all thorium-232 results were below the FRL of 1.5 pCi/g. While some isolated total uranium and radium-226 results exceeded the associated FRLs, no "potential hot spots" (i.e., mobile NaI results above 3x FRL) were identified. Mobile NaI and supplemental HPGe primary ASCOC results are shown on Figure 5 (total uranium), Figure 6 (thorium-232), and Figure 7 (radium-226). The mobile NaI ASCOC results presented in these figures are two-point averaged. All real-time results (RTRAK, RSS and HPGe) presented in the is CDL have been moisture and radon corrected. Also, the worst case (84 percent) moisture correction for the cow manure was applied to all A8PII mobile NaI radium results, and still no result exceeded 3xFRL. Note that only the standard moisture correction was mapped.

After review of the precertification Phase 1 mapped data, and considering other factors discussed in Section 3.4.1 of the SEP, CUs were then established before beginning precertification Phase 2. The next step of precertification was to investigate the areas where the mobile NaI scan identified higher total activity levels. These locations (minimum 1 per CU) were then identified for Phase 2 HPGe readings (see Variance/Field Change Notice (V/FCN) 21100-PSP-0001-4). The results of these readings showed that the three target ASCOCs are present at concentrations well below their respective FRLs at both detector heights. The locations and results of these measurements are shown in Figure 8. Because no two-point moving average RTRAK results were above 3-times the FRL (3x FRL), no Phase 2 hotspot confirmation readings were necessary. All A8PII and A6TA precertification data area accessible through the SED.

## 3.0 AREA-SPECIFIC CONSTITUENTS OF CONCERN

In the OU5 ROD, there are 80 soil COCs with established FRLs. These COCs were retained for further investigation based on a screening process that considered the presence of the constituent in site soil and the potential risk to a receptor exposed to soil containing this contaminant. In spite of the conservative nature of this COC retention process, many of the COCs with established FRLs have a limited distribution in site soil or the presence of the COC is based on high Contract Required Detection Limits (CRDLs). When FRLs were established for these COCs in the OU5 ROD, the FRLs were initially screened against site data presented on spatial maps to establish a picture of potential remediation areas.

By reviewing existing Remedial Investigation/Feasibility Study data presented on spatial distribution maps, it was possible to reduce the sitewide list of soil COCs from 80 listed in the OU5 ROD to 30. This reduction was possible because the majority of the COCs with FRLs listed in the OU5 ROD have no detections on site above their corresponding FRL, thus eliminating them from further consideration. The 30 remaining sitewide COCs account for over 99 percent of the combined risk to a site receptor model, and they comprise the list from which all of the remediation ASCOCs are drawn. When planning certification for a remediation area, additional selection criteria are used to derive a subset of these 30 COCs. This subset of COCs is passed along to the certification process.

### 3.1 SELECTION CRITERIA

The selection process for retaining ASCOCs for a remediation area is driven by applying a set of decision criteria. A soil contaminant will be retained as an A8PII ASCOC if:

- It is listed as a soil COC in the OU5 ROD
- It can be traced to site use, either through process knowledge or known release of the constituent to the environment
- Analytical results indicate the contaminant is present at a concentration above its FRL, and the above-FRL concentrations are not attributable to false positives or elevated CRDLs
- Physical characteristics of the contaminant, such as degradation rate and volatility, indicate it is likely to persist in the soil between time of release and remediation.

- The contaminant is one of the sitewide primary COCs (total uranium, radium-226, radium-228, thorium-232, and thorium-228).

## 3.2 ASCOC SELECTION PROCESS FOR A8PII

Total uranium, radium-226, radium-228, thorium-228 and thorium-232 are sitewide primary COCs, and will be retained as ASCOCs for this reason. As discussed in Section 2.1, historical data and the extensive A8PI certification analytical results show very little above-FRL contamination in western portions of the site, and none of immediate concern. Based on these factors and the inability to identify any mechanism for secondary COC contamination of A8PII, only the sitewide primary COCs will be retained as the A8PII ASCOCs.

## 3.3 ASCOC SELECTION PROCESS FOR THE AREA 6 TRIANGLE AREA

Total uranium, radium-226, radium-228, thorium-228 and thorium-232 are sitewide primary COCs, and will be retained as ASCOCs for this reason. While the SEP lists numerous secondary ASCOCs associated with Remediation Area 6 in Table 2-7, these ASCOCs are associated with the Waste Pits, the source of Area 6 contamination. Based on process history, there is no reason to believe that any of these secondary ASCOCs are present at concentrations above the FRL in the A6TA. As discussed in Section 2.1, this land is located along the site perimeter, and should be treated accordingly. Therefore, the secondary ASCOCs will not be retained for certification sampling in the A6TA, and certification samples will be analyzed for only the five primary ASCOCs.

# 4.0 CERTIFICATION APPROACH

## 4.1 CERTIFICATION DESIGN

The certification design for A8PII and the A6TA follows the general approach outlined in Section 3.4 of the SEP. As discussed in Section 3.0 of this document, total uranium, thorium-228, thorium-232, radium-226, radium-228 (the primary ASCOCs) will be retained in all CUs as the only CU-specific ASCOCs. Because A8PII and the A6TA are considered to be "nonimpacted areas" of the site, Approach E from the SEP will be used as a basis for certification design, as described in Section 4.5 of the SEP. Group 2 CUs, which can be as large as 250,000 square feet, have been located within these areas as follows:

- **CU A8PII-01** (131,562 $ft^2$) - established to generally cover the berm of native soil along parts of the north and west boundary of A8PII.
- **CU A8PII-02** (248,860 $ft^2$) - established to generally cover the portion of A8PII where borrow material was excavated during construction of the FEMP. The precertification scan generally revealed lower total activity readings in these areas.
- **CU A8PII-03** (246,354 $ft^2$) - established to cover the east-central portion of A8PII, including a large portion of the property along Paddys Run.
- **CU A8PII-04** (181,677 $ft^2$) - established to contain the southern portion of A8PII separated by the drainage ditch.
- **CU A6TA-01** (153,064 $ft^2$) - established to contain the southern portion of the A6TA.

Figure 9 shows the location and boundaries of these six CUs. As discussed in Section 1.0, the northern portion of the A6TA (the railroad corridor) will not be included in the scope of this CDL.

The selection of certification sampling locations was conducted according to Section 3.4.2 of the SEP. Each CU was first divided into 16 approximately equal sub-CUs. Sample locations were then generated by randomly selecting an easting and northing coordinate within the boundaries of each sub-CU, and testing the locations against the minimum distance criterion for the CU. If this was the case, an alternative random location was selected for that sub-CU, and all the locations were re-tested. This process continued until all 16 random locations met the minimum distance criterion. The sub-CUs and selected A8PII certification sampling locations are shown in Figure 10.

The allowable minimum distance between pairs ranged from 45.3 feet in CU A8PII-01 to 62.3 feet in CU A8PII-02. Of note, it is possible that subsurface obstacles (e.g., buried rocks or tree roots) could prevent collection at the planned location. If this is the case, the location can be moved up to three feet from the original location, as long as it remains within the same CU and sub-CU boundary. A check of the minimum distances between locations reveals that such a move would not cause a violation of the minimum distance criterion for even the closest of location pairs. A move of more than three feet would require a minimum distance recheck, and approval from the U.S. Environmental Protection Agency (EPA) and Ohio EPA.

As discussed in the Project Specific Plan (PSP) for Area 8, Phase II and A6TA Certification Sampling (DOE 1998d), discrete soil samples will be collected from each of the 16 random sampling locations. Each sample will be collected from the 0 to 6-inch (surface) soil interval at the designated and surveyed sample point. Of the 16 certification samples, a total of 12 will be submitted for analysis. In order to select the 12 samples to analyze but still provide good areal coverage, each CU was divided into quadrants with each quadrant containing four sample locations. Three of the four samples from each quadrant were then randomly selected for analysis, resulting in a total of 12 samples analyzed per CU. The other four samples from each CU are to be archived and analyzed only if necessary.

## 4.2 ANALYTICAL METHODOLOGY AND STATISTICAL ANALYSIS

Laboratory analysis of certification samples will be conducted using an approved analytical method, as discussed in Appendix H of the SEP. Analyses will be conducted to Analytical Support Level (ASL) E, where all requirements are the same as ASL D except the minimum detection level for the selected analytical method must be at least 10 percent of FRL. All results will be validated to ASL B, and a minimum 10 percent of the results from each laboratory will be validated to ASL D. Because results are batched by CU, all results from one of the five CUs will be validated. Samples rejected during this validation will be reanalyzed, or an archive sample may be substituted if there is insufficient material available from the initial sample. If any sample fails this validation, all data from the laboratory with the rejected result will then be validated to determine the integrity of all data from that laboratory. Once data are validated as required, results will be entered into the SED and a statistical analysis will be performed to evaluate the pass/fail criteria for the each CU. The statistical approach is discussed in Section 3.4.3 and Appendix G of the SEP.

Two criteria must be met for the CU to be certified as passing. If the data distribution is normal or lognormal, the first criterion compares the 95 percent Upper Confidence Limit (UCL) on the mean of each primary COC to its FRL. On an individual CU basis, any ASCOC with the 95 percent UCL above the FRL results in that CU failing certification. If the data distribution is not normal or lognormal, the appropriate nonparametric approach discussed in Appendix G of the SEP will be used to evaluate the second criterion. The second criterion is related to the hot spot criterion that is currently being formulated by the U.S. EPA, the OEPA, and the U.S. Department of Energy (DOE). The certification under the scope of this CU will be subject to the agreed upon hot-spot criterion. When the given UCL on the mean for each COC is less than its FRL, and the hot-spot criterion is met, the CU has met both criteria and will be considered certified.

There are three conditions that could result in a CU failing certification: 1) high variability in the data set, 2) localized contamination, and 3) widespread contamination. Details on the evaluation and responses to these possible outcomes are provided in Section 3.4.5 of the SEP. When all CUs within the scope of this CDL have passed certification, a Certification Report will be issued. The Certification Report will be submitted to the regulatory agencies to receive acknowledgment that the pertinent operable unit remedial actions were completed and the individual CUs are certified to be released for interim or final land use. Section 7.4 of the SEP provides additional details and describes the required content of the Certification Report.

## 4.3 RAILROAD CORRIDOR DRAINAGE INVESTIGATION

While the railroad corridor in the A6TA is outside the scope of this CDL, four samples will be collected concurrently with the certification samples to further verify that the drainage from the railroad track corridor is not impacted, since it will be diverted through A8PII after restoration. These samples will be collected from the base of the drainage ditch that runs along the north side of the railroad tracks. Of note, these samples will **not** be considered "certification samples", nor will any type of statistical analysis be performed on the results. However, these results will be reported to the Agencies in the Certification Report for A8PII and the A6TA. Details of the locations, collection, analysis, and validation of these samples are presented in the PSP for A8PII and A6TA Certification Sampling and Drainage Ditch Investigation.

## 5.0 SCHEDULE

The following draft schedule shows key activities for the completion of the work within the scope of this CDL. The primary drivers for this schedule are agreements between DOE, EPA and OEPA on the schedule for initiating work on the Operable Unit 4 Dispute Resolution Habitat Area.

| ACTIVITY | TARGET DATE |
|---|---|
| Submittal of Certification Design Letter | January 29, 1999* |
| Start of Field Work | May 3, 1999 |
| Complete Field Work | May 17, 1999 |
| Complete Analytical Work | June 28, 1999 |
| Complete Data Validation and Statistical Analysis | July 30, 1999 |
| Submit Certification Report | August 31, 1999* |

* Only the dates for submittal of the Certification Design Letter and Certification Report are commitments to the OEPA and EPA. Other dates are internal target completion dates.

## REFERENCES

U. S. Department of Energy, 1996, "Record of Decision for Remedial Action at Operable Unit 5," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U. S. Department of Energy, 1998a, "Sitewide Excavation Plan," Final, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U. S. Department of Energy, 1998b, "User Guidelines, Measurement Strategies, and Operational Factors for Deployment of In-Situ Gamma Spectrometry at the Fernald Site," Draft, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U. S. Department of Energy, 1998c, "In-Situ Gamma Spectrometry QA/QC Program," Draft, Appendix H of the Sitewide CERCLA Quality Assurance Project Plan, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

U. S. Department of Energy, 1998d, "Project Specific Plan for Area 8, Phase II and Area 6 Triangle Area Certification Sampling and Drainage Ditch Investigation," Draft, Fernald Environmental Management Project, DOE, Fernald Area Office, Cincinnati, Ohio.

# TABLE 1
## Historical Data Collected from Area 8, Phase II and the Area 6 Triangle Area

| Area | Parameter | Sample ID | Location | Date | Depth | Northing | Easting | Result | Qual. | Units | QA Type | FRL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A8P2 | Cesium-137 | 005365 | ZONE 3-541 | 4/23/88 | 0-0.167 | 484014.37 | 1345172.96 | 0.7 | J | pCi/g | NORMAL | 1.4 |
| A8P2 | Cesium-137 | 007066 | 3066 | 9/19/87 | 148-149.5 | 483980.66 | 1345237.19 | 0.2 | UJ | PCI/G | DUPLICATE | 1.4 |
| A8P2 | Neptunium-237 | 005365 | ZONE 3-541 | 4/23/88 | 0-0.167 | 484014.37 | 1345172.96 | 0.6 | U | pCi/g | NORMAL | 3.2 |
| A8P2 | Neptunium-237 | 007066 | 3066 | 9/19/87 | 148-149.5 | 483980.66 | 1345237.19 | 0.6 | UJ | PCI/G | DUPLICATE | 3.2 |
| A8P2 | Plutonium-238 | 005365 | ZONE 3-541 | 4/23/88 | 0-0.167 | 484014.37 | 1345172.96 | 0.6 | U | pCi/g | NORMAL | 78 |
| A8P2 | Plutonium-238 | 007066 | 3066 | 9/19/87 | 148-149.5 | 483980.66 | 1345237.19 | 0.6 | UJ | PCI/G | DUPLICATE | 78 |
| A8P2 | Plutonium-239/240 | 005365 | ZONE 3-541 | 4/23/88 | 0-0.167 | 484014.37 | 1345172.96 | 0.6 | U | pCi/g | NORMAL | 77 |
| A8P2 | Plutonium-239/240 | 007066 | 3066 | 9/19/87 | 148-149.5 | 483980.66 | 1345237.19 | 0.6 | UJ | PCI/G | DUPLICATE | 77 |
| A8P2 | Radium-226 | 005365 | ZONE 3-541 | 4/23/88 | 0-0.167 | 484014.37 | 1345172.96 | 0.8 | J | pCi/g | NORMAL | 1.7 |
| A8P2 | Radium-226 | 007066 | 3066 | 9/19/87 | 148-149.5 | 483980.66 | 1345237.19 | 0.5 | UJ | PCI/G | DUPLICATE | 1.7 |
| A8P2 | Radium-228 | 005365 | ZONE 3-541 | 4/23/88 | 0-0.167 | 484014.37 | 1345172.96 | 0.7 | U | pCi/g | NORMAL | 1.8 |
| A8P2 | Radium-228 | 007066 | 3066 | 9/19/87 | 148-149.5 | 483980.66 | 1345237.19 | 1 | UJ | PCI/G | DUPLICATE | 1.8 |
| A8P2 | Ruthenium-106 | 005365 | ZONE 3-541 | 4/23/88 | 0-0.167 | 484014.37 | 1345172.96 | 1.1 | UJ | pCi/g | NORMAL | NA |
| A8P2 | Ruthenium-106 | 007066 | 3066 | 9/19/87 | 148-149.5 | 483980.66 | 1345237.19 | 1.2 | UJ | PCI/G | DUPLICATE | NA |
| A8P2 | Strontium-90 | 005365 | ZONE 3-541 | 4/23/88 | 0-0.167 | 484014.37 | 1345172.96 | 0.5 | UJ | pCi/g | NORMAL | 14 |
| A8P2 | Strontium-90 | 007066 | 3066 | 9/19/87 | 148-149.5 | 483980.66 | 1345237.19 | 0.5 | UJ | PCI/G | DUPLICATE | 14 |
| A8P2 | Technetium-99 | 005365 | ZONE 3-541 | 4/23/88 | 0-0.167 | 484014.37 | 1345172.96 | 1 | U | pCi/g | NORMAL | 30 |
| A8P2 | Thorium, Total | 007066 | 3066 | 9/19/87 | 148-149.5 | 483980.66 | 1345237.19 | 5.4721 | NV | PCI/G | DUPLICATE | NA |
| A8P2 | Thorium-228 | 005162 | ZONE 3-540 | 12/8/87 | 0-0.167 | 484009.38 | 1345530.96 | 0.7 | J | pCi/g | NORMAL | 1.7 |
| A8P2 | Thorium-228 | 005365 | ZONE 3-541 | 4/23/88 | 0-0.167 | 484014.37 | 1345172.96 | 1.1 | - | pCi/g | NORMAL | 1.7 |
| A8P2 | Thorium-228 | 007066 | 3066 | 9/19/87 | 148-149.5 | 483980.66 | 1345237.19 | 0.8 | J | PCI/G | DUPLICATE | 1.7 |
| A8P2 | Thorium-230 | 005162 | ZONE 3-540 | 12/8/87 | 0-0.167 | 484009.38 | 1345530.96 | 1.5 | J | pCi/g | NORMAL | 280 |
| A8P2 | Thorium-230 | 005365 | ZONE 3-541 | 4/23/88 | 0-0.167 | 484014.37 | 1345172.96 | 1.4 | - | pCi/g | NORMAL | 280 |
| A8P2 | Thorium-232 | 005162 | ZONE 3-540 | 12/8/87 | 0-0.167 | 484009.38 | 1345530.96 | 0.7 | J | pCi/g | NORMAL | 1.5 |
| A8P2 | Thorium-232 | 005365 | ZONE 3-541 | 4/23/88 | 0-0.167 | 484014.37 | 1345172.96 | 1 | - | pCi/g | NORMAL | 1.5 |
| A8P2 | Thorium-232 | 007066 | 3066 | 9/19/87 | 148-149.5 | 483980.66 | 1345237.19 | 0.6 | J | PCI/G | DUPLICATE | 1.5 |
| A8P2 | Uranium, Total | 005162 | ZONE 3-540 | 12/8/87 | 0-0.167 | 484009.38 | 1345530.96 | 4.19796 | J | mg/kg | NORMAL | 82 |
| A8P2 | Uranium, Total | 005365 | ZONE 3-541 | 4/23/88 | 0-0.167 | 484014.37 | 1345172.96 | 5.09753 | - | mg/kg | NORMAL | 82 |
| A8P2 | Uranium, Total | 007003 | 2066 | 8/25/87 | 4.5-6.0 | 483968.32 | 1345234.41 | 2.69869 | J | mg/kg | NORMAL | 82 |
| A8P2 | Uranium, Total | 007049 | 3066 | 9/17/87 | 100-101.5 | 483980.66 | 1345237.20 | 2.99854 | J | mg/kg | NORMAL | 82 |
| A8P2 | Uranium, Total | 007066 | 3066 | 9/19/87 | 148-149.5 | 483980.66 | 1345237.19 | 2.3639 | NV | PCI/G | DUPLICATE | 82 |
| A8P2 | Uranium-234 | 005162 | ZONE 3-540 | 12/8/87 | 0-0.167 | 484009.38 | 1345530.96 | 1.9 | J | pCi/g | NORMAL | N/A |
| A8P2 | Uranium-234 | 005365 | ZONE 3-541 | 4/23/88 | 0-0.167 | 484014.37 | 1345172.96 | 1.5 | - | pCi/g | NORMAL | N/A |
| A8P2 | Uranium-234 | 007003 | 2066 | 8/25/87 | 4.5-6.0 | 483968.32 | 1345234.41 | 0.9 | J | pCi/g | NORMAL | N/A |
| A8P2 | Uranium-234 | 007049 | 3066 | 9/17/87 | 100-101.5 | 483980.66 | 1345237.20 | 0.9 | J | pCi/g | NORMAL | N/A |
| A8P2 | Uranium-234 | 007066 | 3066 | 9/19/87 | 148-149.5 | 483980.66 | 1345237.19 | 0.6 | UJ | PCI/G | DUPLICATE | N/A |
| A8P2 | Uranium-235/236 | 005162 | ZONE 3-540 | 12/8/87 | 0-0.167 | 484009.38 | 1345530.96 | 0.6 | UJ | pCi/g | NORMAL | N/A |
| A8P2 | Uranium-235/236 | 005365 | ZONE 3-541 | 4/23/88 | 0-0.167 | 484014.37 | 1345172.96 | 0.6 | U | pCi/g | NORMAL | N/A |

81

1955

# TABLE 1
## Historical Data Collected from Area 8, Phase II and the Area 6 Triangle Area

| Area | Parameter | Sample ID | Location | Date | Depth | Northing | Easting | Result | Qual. | Units | QA Type | FRL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A8P2 | Uranium-235/236 | 007003 | 2066 | 8/25/87 | 4.5-6.0 | 483968.32 | 1345234.41 | 0.6 | UJ | pCi/g | NORMAL | N/A |
| A8P2 | Uranium-235/236 | 007049 | 3066 | 9/17/87 | 100-101.5 | 483980.66 | 1345237.20 | 0.6 | UJ | pCi/g | NORMAL | N/A |
| A8P2 | Uranium-235/236 | 007066 | 3066 | 9/19/87 | 148-149.5 | 483980.66 | 1345237.19 | 0.6 | UJ | PCI/G | DUPLICATE | N/A |
| A8P2 | Uranium-238 | 005162 | ZONE 3-540 | 12/8/87 | 0-0.167 | 484009.38 | 1345530.96 | 1.4 | J | pCi/g | NORMAL | N/A |
| A8P2 | Uranium-238 | 005365 | ZONE 3-541 | 4/23/88 | 0-0.167 | 484014.37 | 1345172.96 | 1.7 | - | pCi/g | NORMAL | N/A |
| A8P2 | Uranium-238 | 007003 | 2066 | 8/25/87 | 4.5-6.0 | 483968.32 | 1345234.41 | 0.9 | J | pCi/g | NORMAL | N/A |
| A8P2 | Uranium-238 | 007049 | 3066 | 9/17/87 | 100-101.5 | 483980.66 | 1345237.20 | 1 | J | pCi/g | NORMAL | N/A |
| A8P2 | Uranium-238 | 007066 | 3066 | 9/19/87 | 148-149.5 | 483980.66 | 1345237.19 | 0.7 | J | PCI/G | DUPLICATE | N/A |
| A6TA | Uranium, Total | 403451 | 11490 | 1/11/95 | 46.5 | 482849.37 | 1344520.00 | 2.051 | - | mg/kg | NORMAL | 82 |
| A6TA | Uranium, Total | 403462 | 11489 | 1/11/95 | 36 | 482849.16 | 1344522.80 | 2.68969 | - | mg/kg | NORMAL | 82 |
| A6TA | Uranium, Total | 403466 | 11488 | 1/11/95 | 6.5-7.0 | 482849.27 | 1344524.80 | 3.23843 | - | mg/kg | NORMAL | 82 |
| A6TA | Uranium-234 | 403451 | 11490 | 1/11/95 | 46.5 | 482849.37 | 1344520.00 | 0.642 | - | pCi/g | NORMAL | N/A |
| A6TA | Uranium-234 | 403462 | 11489 | 1/11/95 | 36 | 482849.16 | 1344522.80 | 0.764 | - | pCi/g | NORMAL | N/A |
| A6TA | Uranium-234 | 403466 | 11488 | 1/11/95 | 6.5-7.0 | 482849.27 | 1344524.80 | 0.882 | - | pCi/g | NORMAL | N/A |
| A6TA | Uranium-235/236 | 403451 | 11490 | 1/11/95 | 46.5 | 482849.37 | 1344520.00 | 0.1 | U | pCi/g | NORMAL | N/A |
| A6TA | Uranium-235/236 | 403462 | 11489 | 1/11/95 | 36 | 482849.16 | 1344522.80 | 0.1 | UJ | pCi/g | NORMAL | N/A |
| A6TA | Uranium-235/236 | 403466 | 11488 | 1/11/95 | 6.5-7.0 | 482849.27 | 1344524.80 | 0.1 | U | pCi/g | NORMAL | N/A |
| A6TA | Uranium-238 | 403451 | 11490 | 1/11/95 | 46.5 | 482849.37 | 1344520.00 | 0.684 | - | pCi/g | NORMAL | N/A |
| A6TA | Uranium-238 | 403462 | 11489 | 1/11/95 | 36 | 482849.16 | 1344522.80 | 0.897 | - | pCi/g | NORMAL | N/A |
| A6TA | Uranium-238 | 403466 | 11488 | 1/11/95 | 6.5-7.0 | 482849.27 | 1344524.80 | 1.08 | - | pCi/g | NORMAL | N/A |

1955

19

**TABLE 2**
**ASCOC LIST FOR ALL A8PII AND A6TA CUs**

| ASCOC | FRL | Reason Retained |
|---|---|---|
| Total Uranium | 82 mg/Kg | Retained as a primary ASCOC sitewide |
| Radium-226 | 1.7 pCi/g | Retained as a primary ASCOC sitewide |
| Radium-228 | 1.8 pCi/g | Retained as a primary ASCOC sitewide |
| Thorium-228 | 1.7 pCi/g | Retained as a primary ASCOC sitewide |
| Thorium-232 | 1.5 pCi/g | Retained as a primary ASCOC sitewide |

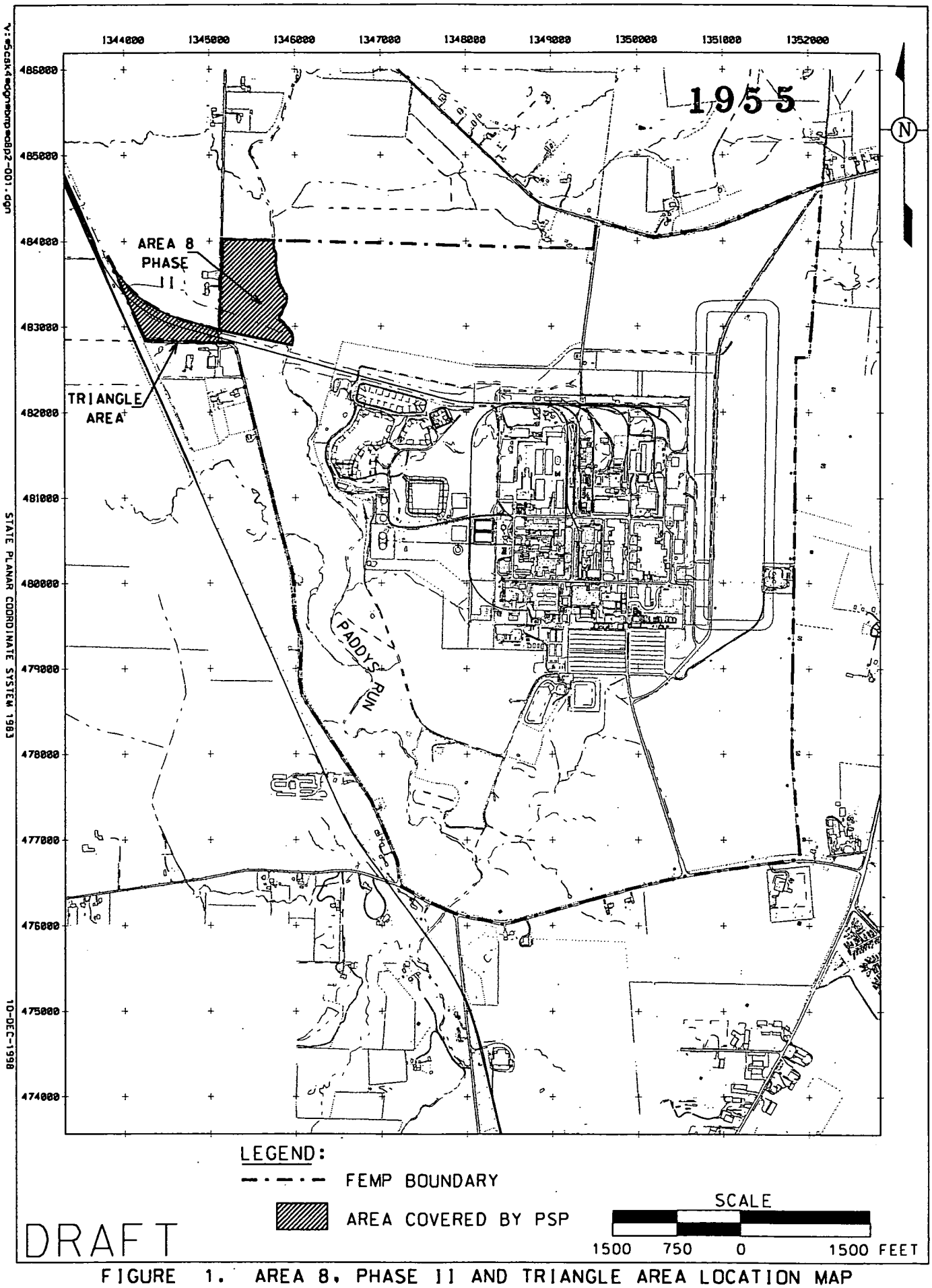
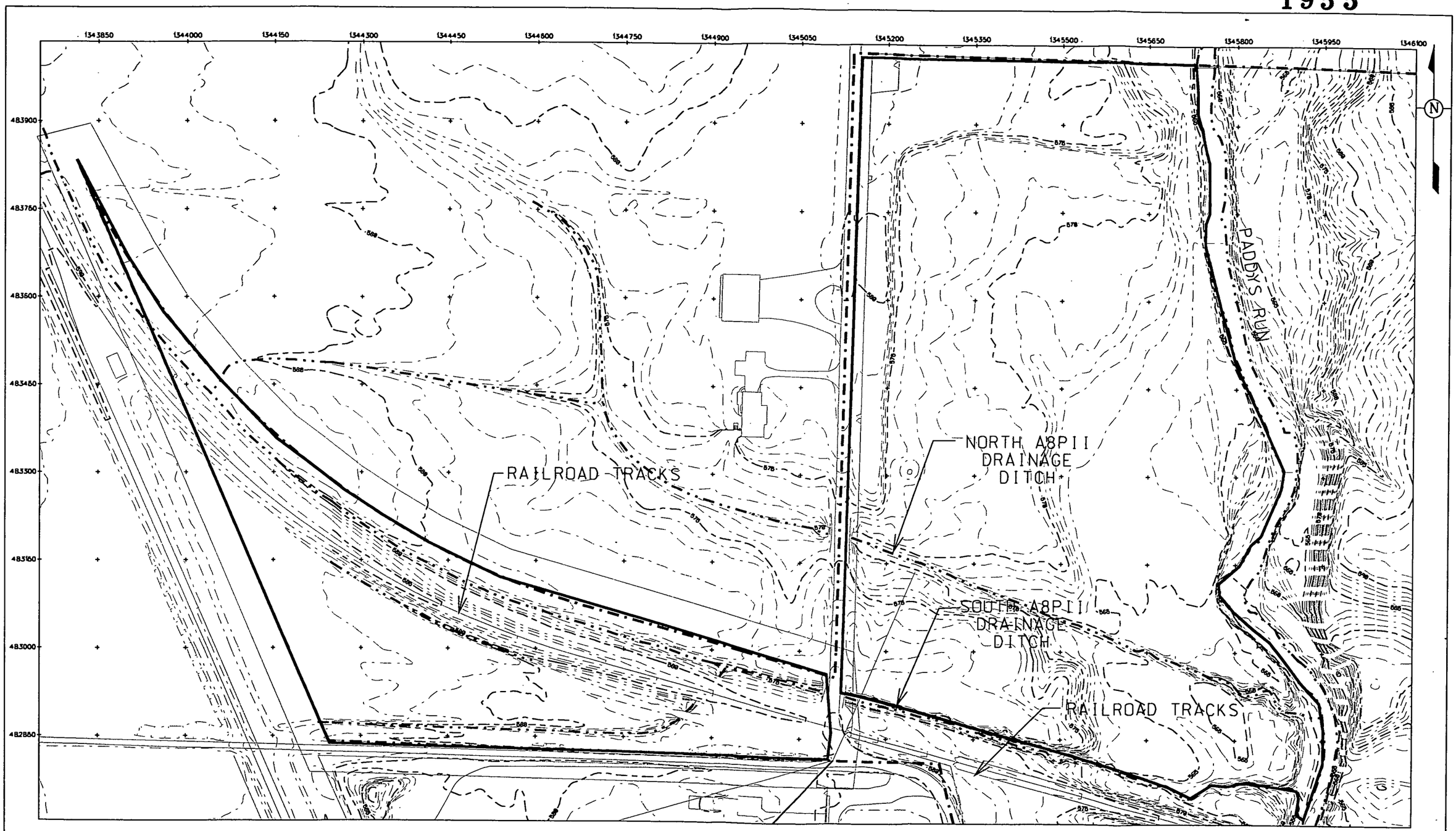



FIGURE 1. AREA 8, PHASE II AND TRIANGLE AREA LOCATION MAP

1955




22

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V:#5c8k4#dgn#bmp#a8p2-002.dgn STATE PLANAR COORDINATE SYSTEM 1983 05-JAN-1999

FIGURE 2. A8PII AND TRIANGLE AREA TOPOGRAPHY AND SURFACE FEATURES

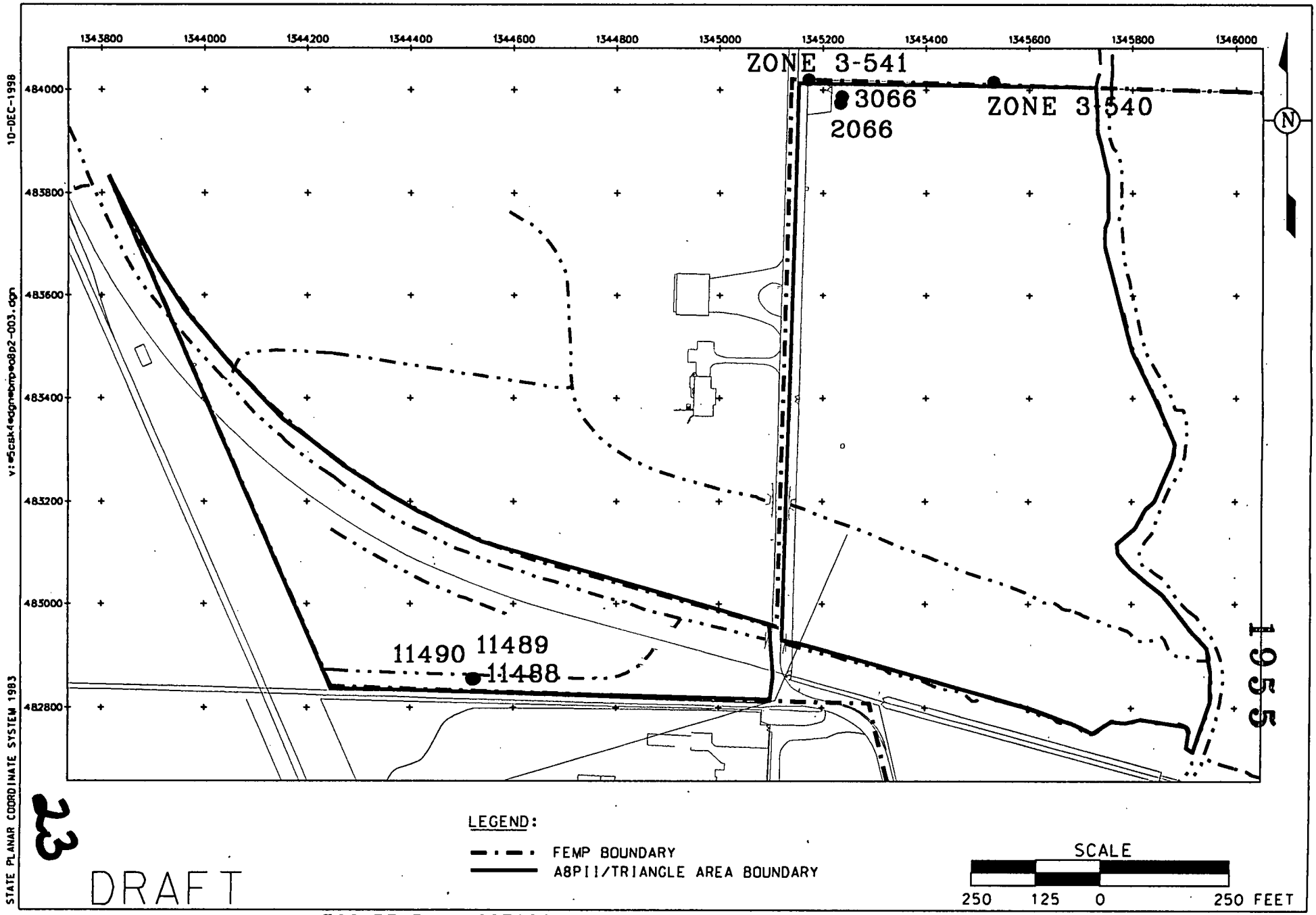
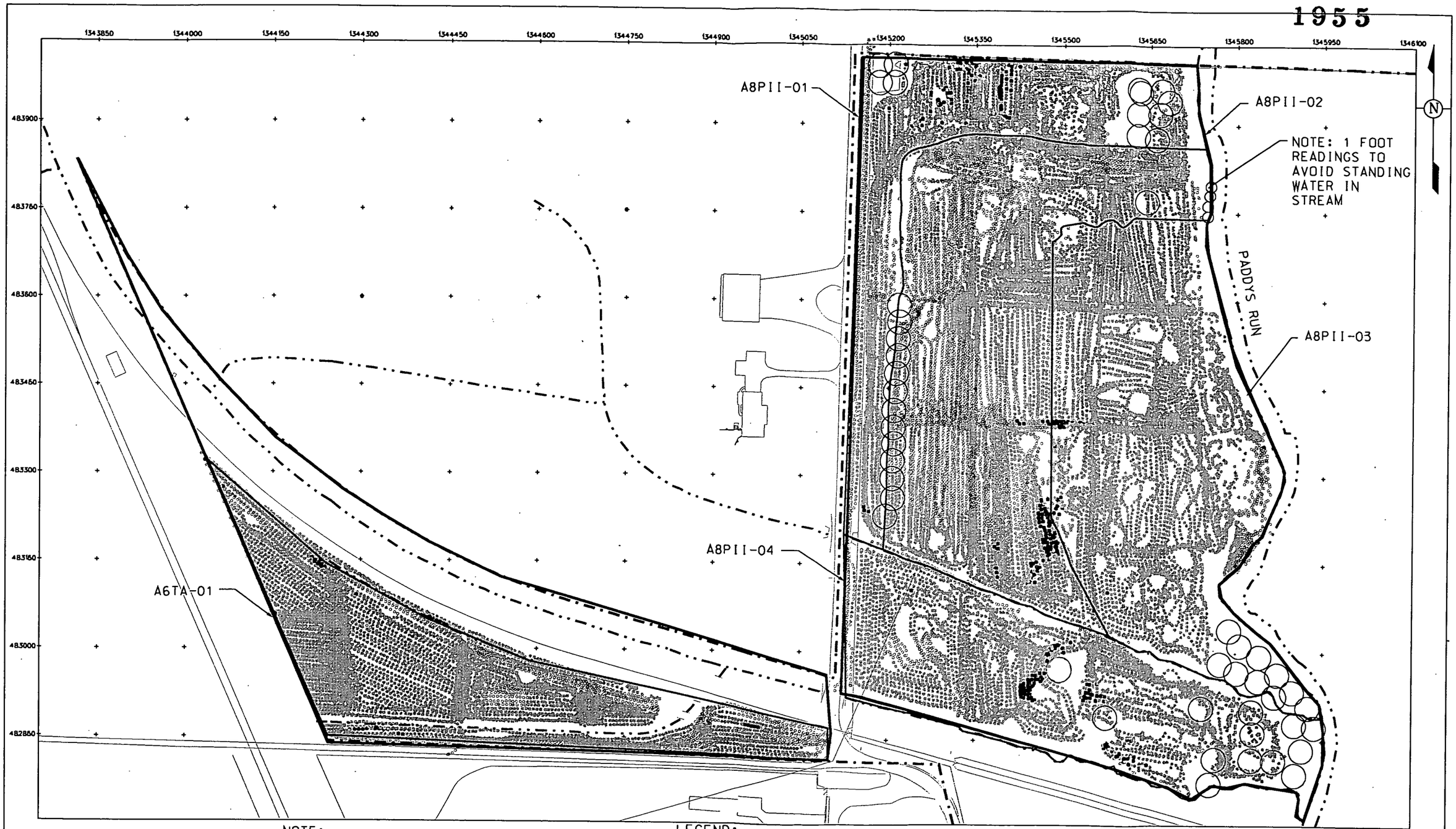



FIGURE 3. HISTORICAL BORINGS WITHIN A8PII AND THE TRIANGLE AREA

1955




NOTE:
MAXIMUM READING = 2743 CPS
HPGE READINGS SHOWN FOR COVERAGE

LEGEND:
- 0 TO 2000
- 2000 TO 2500
- 2500 TO 3000
- HPGE READING
- FEMP BOUNDARY
- A8PII/TRIANGE AREA CU BOUNDARY

SCALE
150 75 0 150 FEET

24

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v:#5cs&k4#dgn#bmp#a8p2-007.dgn STATE PLANAR COORDINATE SYSTEM 1983 20-JAN-1999

FIGURE 4. MOBILE NAI TOTAL ACTIVITY RESULTS AND PHASE I HPGE READINGS LOCATIONS

1955

1343850 1344000 1344150 1344300 1344450 1344600 1344750 1344900 1345050 1345200 1345350 1345500 1345650 1345800 1345950 1346100

483900 483750 483600 483450 483300 483150 483000 482850

PADDYS RUN

N

LEGEND:

- ○ HPGE RESULT BELOW FRL
- ▨ HPGE RESULT 1XFRL TO 3XFRL
- ● HPGE RESULT > 3XFRL (MAXIMUM RESULT = 20.5 ppm)
- ◦ RTRAK/RSS RESULT BELOW FRL
- • RTRAK/RSS RESULT 1XFRL TO 3XFRL
- • RTRAK/RSS RESULT > 3XFRL (MAXIMUM RESULT = 120.9 ppm)
- ·-·-· FEMP BOUNDARY
- —— A8PII/TRIANGE AREA BOUNDARY

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SCALE
150 75 0 150 FEET

25

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FIGURE 5. MOBILE NAI AND PHASE 1 HPGE TOTAL URAINIUM RESULTS

1955

1343850 1344000 1344150 1344300 1344450 1344600 1344750 1344900 1345050 1345200 1345350 1345500 1345650 1345800 1345950 1346100

483900 483750 483600 483450 483300 483150 483000 482850

N

LEGEND:

- ○ HPGE RESULT BELOW FRL
- ◍ HPGE RESULT 1XFRL TO 3XFRL
- ● HPGE RESULT > 3XFRL (MAXIMUM RESULT = 0.76 pCi/g)
- ◦ RTRAK/RSS RESULT BELOW FRL
- • RTRAK/RSS RESULT 1XFRL TO 3XFRL
- · RTRAK/RSS RESULT > 3XFRL (MAXIMUM RESULT = 1.39 pCi/g)
- FEMP BOUNDARY
- A8P11/TRIANGE AREA BOUNDARY

SCALE 150 75 0 150 FEET

26

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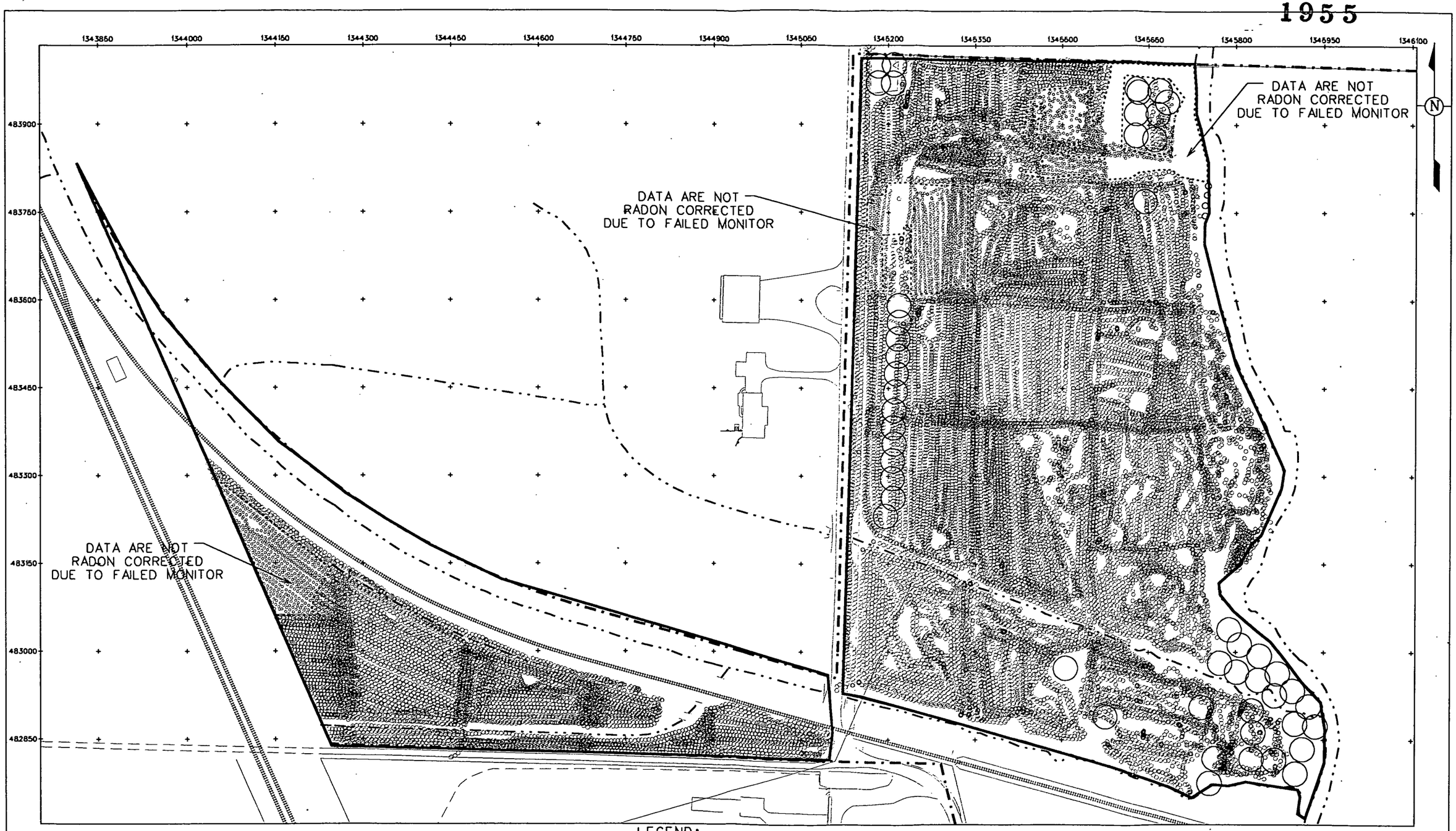
FIGURE 6. MOBILE NAI AND PHASE 1 HPGE THORIUM-232 RESULTS

1955




LEGEND:

- ○ HPGE RESULT BELOW FRL
- ◍ HPGE RESUKLT 1XFRL TO 3XFRL
- ● HPGE RESULT > 3XFRL (MAXIMUM RESULT = 1.25 pCi/g)
- ---·--- FEMP BOUNDARY
- ◦ RTRAK/RSS RESULT BELOW THE FRL
- ◉ RTRAK/RSS RESULT 1XFRL TO 3XFRL
- • RTRAK/RSS RESULT > 3XFRL (MAXIMUM RESULT = 2.44 pCi/g)

SCALE 27

150 75 0 150 FEET

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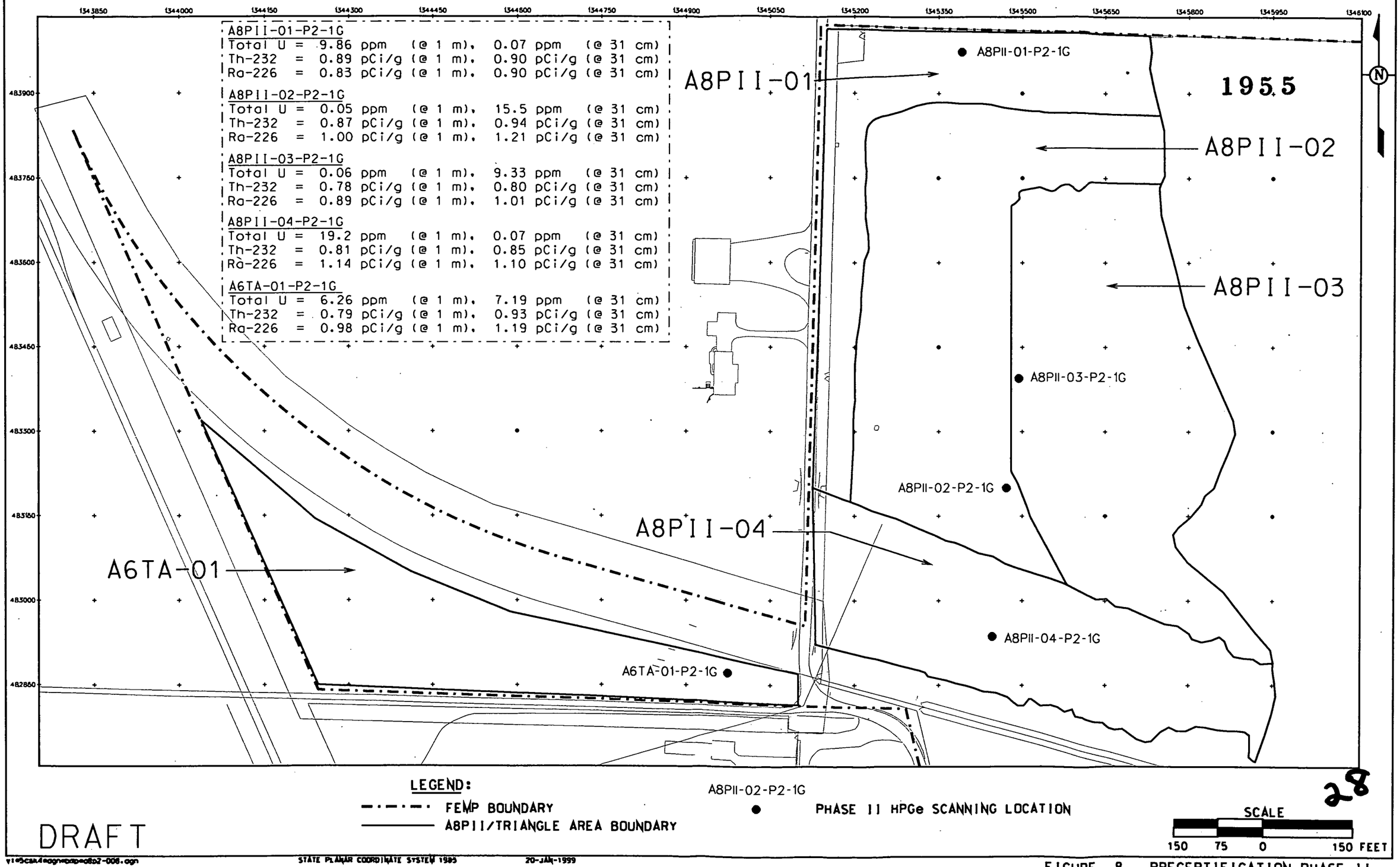
FIGURE 7. MOBILE NAI AND PHASE I HPGE RADIUM-226 RESULTS




28

FIGURE 8. PRECERTIFICATION PHASE II HPGe LOCATIONS AND RESULTS

1955

A8PII-01
Area = 131,562 sq ft

A8PII-02
Area = 249,124 sq ft

A8PII-03
Area = 246,090 sq ft

A8PII-04
Area = 181,925 sq ft

A6TA-01
Area = 153,064 sq ft

PADDYS RUN

LEGEND:
FEMP BOUNDARY
A8PII/TRIANGLE AREA BOUNDARY

SCALE
150 75 0 150 FEET

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FIGURE 9. CERTIFICATION UNITS IDENTIFED WITHIN A8PII AND THE TRIANGLE AREA

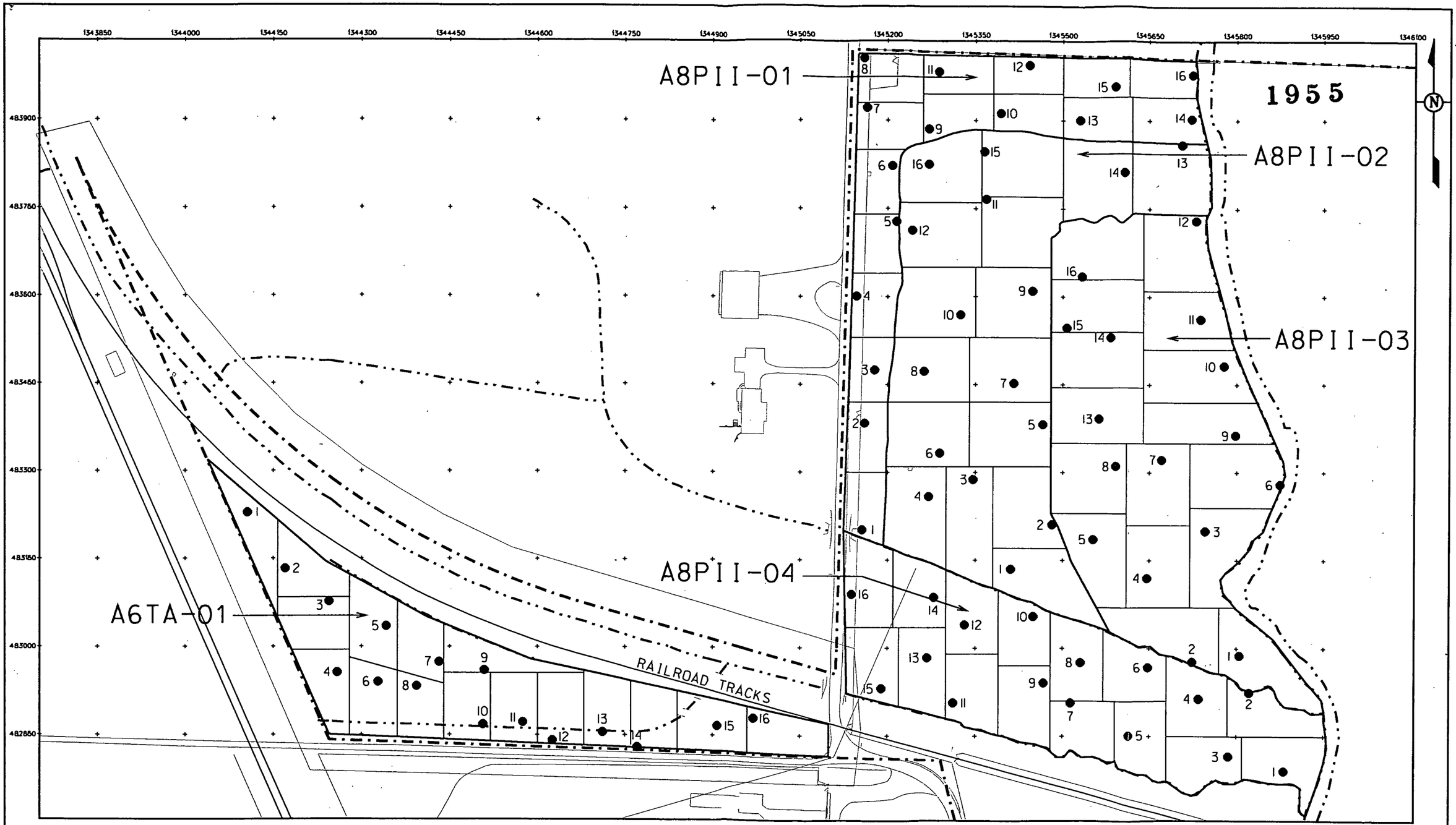


FIGURE 10. A8PII AND TRIANGLE AREA SUB-CUs AND CERTIFICATIONI SAMPLING LOCATIONS